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Western and Northern Canadian Protocol (WNCP)

Common Curriculum Framework (CCF)

for

Kindergarten to Grade 9 Mathematics

(By Strand)

Consultation Draft

January 2005

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Number

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
Numbers 1 to 10	*Numbers to 100*	*Number to 100 – greater depth*	*Numbers to 1000*	*Numbers to 10 000, Fractions*
General Outcome Develop number sense.	**General Outcome** Develop number sense.	**General Outcome** Develop number sense.	**General Outcome** Develop number sense.	**General Outcome** Develop number sense.
Specific Outcomes 1. Say the number sequence by 1s from 1 to 10 and from 10 to 1 using any starting point. [C, CN] 2. Recognize at a glance and name familiar arrangements of numbers 1 to 5. [C, CN, V] 3. Relate numerals 1 to 10, to quantity in a variety of ways. [CN, R, V] 4. Represent a number (2 to 5) in two parts and name the parts. [C, CN, R, V] 5. Compare quantities 1 to 10 using one-to-one correspondence. [C, CN, V]	**Specific Outcomes** 1. Demonstrate an understanding of counting by: • indicating that the last number said identifies "how many"; • show that any collection has only one "count"; • using the counting on strategy; • using parts or equal groups to count collection. [C, CN, R, V] 2. Recognize at a glance familiar arrangements of numbers up to and including 10. [CN, V] 3. Represent and describe numbers to 20 in a variety of ways. [C, CN, V] 4. Identify where numerals are used in everyday situations, including coins. [C, CN, R, V]	**Specific Outcomes** 1. Represent and describe numbers to 100 in a variety of ways, including coins. [C, CN, V] 2. Demonstrate if a number from 1 to 100 is even or odd. [C, CN, R] 3. Illustrate the meaning of numerals to 100 using models of place value. [C, CN, R, V] 4. Compare and order numerals to 100. [C, CN, R, V] 5. Say the number sequence by: • 2s, 5s and 10s, forwards and backwards, using starting points that are multiples of 2, 5 and 10 respectively; • 10s using starting points from 1 to 9; • 2s starting from 1. [C]	**Specific Outcomes** 1. Represent and describe numbers to 1000 in a variety of ways. [C, CN, V] 2. Illustrate the meaning of numerals to 1000 using models of place value. [C, CN] 3. Compare and order numerals to 1000. [PS, R, V] 4. Say the number sequence by 25s or 100s to 1000 using starting points that are multiples of 25 or 100 respectively. [C, CN]	**Specific Outcomes** 1. Represent and describe numbers to 10 000 in a variety of ways. [C, CN, V] 2. Compare and order numerals to 10 000 by making reference to place value. [C, CN, PS] 3. Solve problems that involve addition and subtraction. [C, PS, R] 4. Estimate sums and differences to solve problems. [CN, E, PS, R] 5. Explain the properties of 0 and 1 for multiplication and of 1 for division. [C, CN, R]

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Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
One Million, Fractions, Hundredths and Tenths	*Fractions, Any Decimal*	*Operations on Rational Numbers, Exponents*	*Radicals, Ratio, Proportion*	*Scientific Notation, Real numbers*
General Outcome Develop number sense.	**General Outcome** Develop number sense.	**General Outcome** Develop number sense.	**General Outcome** Develop number sense.	**General Outcome** Develop number sense.
Specific Outcomes 1. Represent and describe numbers to 1 000 000 in a variety of ways. [C, CN, V] 2. Develop and justify a rule for comparing and ordering numerals to 1 000 000 [C, CN, R] 3. Apply the basic multiplication and related division facts to solve problems. [PS, R] 4. Demonstrate an understanding of multiplication by: • determining multiples and factors of numbers less than 100 using a variety of strategies; • identifying prime and composite numerals; • determining the product of two 2-digit numerals. [PS, R, V]	**Specific Outcomes** 1. Demonstrate an awareness of the magnitude of numbers greater than one million and less than one thousandth. [C, CN, R] 2. Represent and describe percent in a variety of ways. [C, R] 3. Represent and describe the relationship between decimals (to hundredths), fractions and percents. [C, CN, PS, V] 4. Solve, using technology, multiplication and division problems involving large numbers [PS, T] 5. Relate improper fractions to mixed numbers. [CN, PS, R, V]	**Specific Outcomes** 1. Write a whole number in a variety of forms including: • an expanded numeral using powers of 10; • scientific notation and vice versa; • combined decimals and place value words; • selecting an appropriate form for a whole number for a given purpose. and vice-versa. [C, CN, PS, V] 2. Express fractions as decimals (repeating or terminating) and terminating decimals as fractions. [C, CN, T] 3. Classify fractions and their decimal representations according to the type of decimal (including repeating and terminating decimals), and explain whether the decimal form is approximate or exact. [C, CN, R]	**Specific Outcomes** 1. Represent square numbers and their square roots concretely, pictorially and symbolically. [C, CN, R] 2. Recognize and explain that the square root of a non-perfect square is a decimal approximation. [C, E, R, T] 3. Approximate the square root of numbers using square numbers as benchmarks. [C, R] 4. Explain and illustrate that a numeral in the form $\frac{a}{b}$ can be interpreted as: • a fraction; • a rate ratio; • a comparison ratio; • division; • a probability. [C, CN, R] 5. Solve problems involving rates, ratios and proportions. [PS, R]	**Specific Outcomes** 1. Solve problems with square root solutions and justify the inclusion of either the positive or negative solutions, or both. [C, CN, PS, R, V] 2. Explain and apply the exponent laws with integral exponents and bases, including: • $(a^m)(a^n) = a^{m+n}$ • $a^m \div a^n = a^{m-n}$ • $(a^m)^n = a^{mn}$ • $(ab)^m = a^m b^m$ • $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n},\ b \neq 0$ • $a^0 = 1,\ a \neq 0$ • $a^{-n} = \frac{1}{a^n},\ a \neq 0$. [C, CN, PS, R] 3. Evaluate exponential expressions with numeric bases with and without a calculator. [E, T]

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Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
	Numbers to 100	*Number to 100 – greater depth*	*Numbers to 1000*	*Numbers to 10 000, Fractions*
	General Outcome Develop number sense.	**General Outcome** Develop number sense.	**General Outcome** Develop number sense.	**General Outcome** Develop number sense.
	Specific Outcomes 5. Say the number sequence by: • 1s forwards and backwards between any two given numbers; • 2s, 5s and 10s starting at 0 or 100. [C] 6. Compare sets to 20 using • benchmarks; • direct comparison. [C, CN, R, V] 7. Identify the numeral that is one more, two more, one less and two less than a given numeral. [C, CN, PS, V] 8. Demonstrate an understanding of addition and subtraction by: • using familiar and mathematical language to describe additive and subtractive actions from their experience; • solving and creating problems in context that involve addition and subtraction from 0 to 18; • modelling addition and subtraction using a variety of concrete and visual representations, and recording the process symbolically (0 to 18). [C, CN, R, V]	**Specific Outcomes** 6. Describe order or position using ordinal numbers (up to tenth). [C, CN, R] 7. Apply mental mathematics strategies to develop the recall of basic addition facts to 18 and related subtraction facts. [CN, E, R, V] 8. Demonstrate an understanding of addition and subtraction by: • using personal procedures for adding and subtracting with and without the support of concrete materials; • solving and creating problems in context that involve addition and subtractions with answers to 100; • explaining that the order in which numbers are added does not matter. [C, CN, PS, R, V]	**Specific Outcomes** 5. Demonstrate an understanding of addition and subtraction by: • using personal procedures for adding and subtracting with and without the support of base ten materials; • solving and creating problems in context that involve addition and subtraction of numbers with answers up to 1000; • applying the commutative and associative properties for addition. [CN, PS, R, V] 6. Apply estimation and mental mathematics strategies for adding and subtracting. [E, PS, R] 7. Estimate quantities less than 1000 by using benchmarks. [E, PS, R] 8. Apply the basic addition facts to 18 and related subtraction facts to solve problems. [PS, R]	**Specific Outcomes** 6. Communicate and use mental mathematics strategies to develop the recall of multiplication facts to 9×9 such as: • skip counting; • skip counting from a known fact; • using doubling or halving; • using doubling or halving and adding or subtracting one more set; • using patterns in the 9s facts; • using repeated doubling. [C, E, PS, R] 7. Demonstrate an understanding of multiplication (1-digit by 2 or 3 digit) to solve problems by: • inventing personal procedures with and without the support of concrete materials; • using area models to represent multiplication. [C, CN, PS, R, V]

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Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
One Million, Fractions, Hundredths and Tenths	*Fractions, any Decimal*	*Operations on Rational Numbers, Exponents*	*Radicals, Ratio, Proportion*	*Scientific Notation, Real numbers*
General Outcome Develop number sense.	**General Outcome** Develop number sense.	**General Outcome** Develop number sense.	**General Outcome** Develop number sense.	**General Outcome** Develop number sense.
Specific Outcomes 5. Communicate and use mental mathematics strategies for multiplication including: • annexing zero; • using the distributive property. [C, E, PS, R] 6. Demonstrate an understanding of division (3-digit by 1-digit) to solve problems by using personal procedures for dividing with and without the support of concrete materials. [C, CN, E, PS] 7. Use estimation strategies (in problem solving settings) including: • front end calculation; • compensation; • compatible numbers; • rounding. [C, CN, E, PS]	**Specific Outcomes** 6. Demonstrate an understanding of integers by: • providing examples of contexts that involve integers and explaining what information the integers convey; • comparing and ordering integers in a variety of ways, including on a number line. [C, CN, PS, R, V] 7. Demonstrate an understanding of the addition and subtraction of decimals in problem-solving contexts. [CN, E, PS, T] 8. Demonstrate an understanding of multiplication and division of decimals to hundredths (1-digit whole number multipliers and divisors) in problem-solving contexts. [CN, E, PS, T]	**Specific Outcomes** 4. Determine and explain why a numeral is divisible by 2, 3, 4, 5, 6, 9 or 10 and can not be divided by 0. [C, R] 5. Demonstrate an understanding of adding and subtracting positive fractions with like and unlike denominators concretely, pictorially and symbolically. [C, CN, PS] 6. Define and apply power, base and exponent to represent repeated multiplication. [C, T, V] 7. Solve problems involving the addition, subtraction, multiplication and division of decimal numbers (for more than 1-digit divisors or multipliers, the use of technology is expected). [E, PS, T] 8. Explain and demonstrate that the sum of opposite integers is zero. [C, CN, R, V]	**Specific Outcomes** 6. Derive, explain and apply the exponent laws with whole number exponents and bases, including: • $(a^m)(a^n) = a^{m+n}$ • $a^m \div a^n = a^{m-n}$ • $(a^m)^n = a^{mn}$ • $(ab)^m = a^m b^m$ • $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n},\ b \neq 0$ • $a^0 = 1,\ a \neq 0.$ [C, CN, PS, R] 7. Compare and order rational numbers in a variety of ways, including number lines and benchmarks. [CN, R, V] 8. Estimate to predict whether a product or quotient will be greater than 1, less than 1 or about 1. [CN, E, PS, R] 9. Explain a strategy when multiplying and dividing positive fractions. [C, CN, PS]	**Specific Outcomes** 4. Explain a strategy when adding and subtracting negative fractions and negative decimals. [C, CN, PS, R, T] 5. Explain a strategy when multiplying and dividing negative fractions and negative decimals. [C, CN, PS, R, T] 6. Illustrate and explain the order of operation, with and without technology. [C, CN, PS, T]

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Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
	Numbers to 100	*Number to 100 – greater depth*	*Numbers to 1000*	*Numbers to 10 000, Fractions*
	General Outcome Develop number sense.	**General Outcome** Develop number sense.	**General Outcome** Develop number sense.	**General Outcome** Develop number sense.
	Specific Outcomes 9. Communicate and use mental mathematics strategies (memorization not intended) for adding and subtracting such as: • bridging to 5 or 10; • counting on and counting back; • building up and building down to 10; • building on a known double; • connecting addition to subtraction. [C, CN, E, PS, R, V]	**Specific Outcomes** 9. Communicate and use mental mathematics strategies for adding and subtracting such as: • building on doubles; • counting on or back using steps larger than a unit; • bridging to 10 or multiples of ten; • changing the order of addends; • using a known sum or difference. [C, CN, E, PS, R, V] 10. Explain what happens when zero is added to or subtracted from any number. [C,R] 11. Estimate quantities less than 100 by using benchmarks. [E, PS]	**Specific Outcomes** 9. Demonstrate an understanding of multiplication and division by: • using familiar and mathematical language to describe multiplicative and divisive actions from their experience; • solving and creating problems in context that involve multiplication and division; • representing and explaining multiplication using array models and equal grouping; • relate division to multiplication using array models and equal grouping. [C, CN, PS, R]	**Specific Outcomes** 8. Demonstrate an understanding of division (1-digit divisor up to 2-digit dividend) to solve problems by: • using personal procedures for dividing with and without the support of concrete materials; • relating division to multiplication using the area model. [C, CN, PS, R, V] 9. Demonstrate an understanding of fractions less than or equal to one by using concrete and visual models to: • name and record fractions for the parts of a region or a set; • compare and order unit fractions; • illustrate and explain that two identical fractions may not represent the same quantity. [C, CN, PS, R, V]

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Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
One Million, Fractions, Hundredths and Tenths	*Fractions, any Decimal*	*Operations on Rational Numbers, Exponents*	*Radicals, Ratio, Proportion*	
General Outcome Develop number sense.	**General Outcome** Develop number sense.	**General Outcome** Develop number sense.	**General Outcome** Develop number sense.	
Specific Outcomes 8. Demonstrate an understanding of fractions by using concrete and visual models to: • create sets of equivalent fractions; • compare fractions with like and unlike denominators. [C, CN, PS, R, V] 9. Describe and represent decimals to thousandths in a variety of ways. [C, CN, R, V] 10. Illustrate and explain how proper fractions and decimals are related (to thousandths). [C, R, V] 11. Order and compare decimals to thousandths by using: • benchmarks; • visual and concrete models; • position on a number line; • place value; • equivalent decimals. [CN, R, V]	**Specific Outcomes** 9. Use estimation to predict products and quotients of decimals to hundredths (1-digit whole number multipliers and divisors). [E, PS, R]	**Specific Outcomes** 9. Explain a strategy when adding and subtracting integers concretely, pictorially and symbolically. [C, CN, PS, R, V]	**Specific Outcomes** 10. Demonstrate an understanding of percents by: • modelling fractional percents and percents greater than 100; • representing percents greater than 100 and smaller than 1 in decimal and fractional form; • applying percents in a variety of contexts. [CN, PS, R, V] 11. Explain a strategy when multiplying and dividing integers concretely, pictorially and symbolically. [C, CN, PS, R, V]	

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Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
			Numbers to 1000	*Numbers to 10 000, Fractions*
			General Outcome Develop number sense.	**General Outcome** Develop number sense.
			Specific Outcomes 10. Demonstrate an understanding of fractions by: • distinguishing fractions and non-fractions; • explaining the meaning of the numerator and the denominator; • naming and recording fractions for the parts of a region; • comparing and ordering fractions with like denominators; • describing where fractions are used. [C, CN, PS, R, V]	**Specific Outcomes** 10. Order and compare fractions using concrete models, a number line and benchmarks of 0, $\frac{1}{2}$ and 1. [CN, PS, R, V] 11. Illustrate and explain decimals (tenths and hundredths) as part of a length, region, or set. [C, R, V] 12. Illustrate and explain how proper fractions and decimals are related (to hundredths). [C, CN, PS, V] 13. Order and compare decimals to hundredths by using • benchmarks; • visual and concrete models; • position on a number line; • place value; • equivalent decimals. [CN, R, V]

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Number (continued)

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9

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Patterns and Relations (Patterns)

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
Repeating Patterns	*Repeating and Growing Patterns*	*Numeric and Geometric Patterns*	*Increasing & Decreasing Numeric Patterns*	*Relationships*
General Outcome Use patterns to describe the world and to solve problems.	**General Outcome** Use patterns to describe the world and to solve problems.	**General Outcome** Use patterns to describe the world and to solve problems.	**General Outcome** Use patterns to describe the world and to solve problems.	**General Outcome** Use patterns to describe the world and to solve problems.
Specific Outcomes 1. Describe the pattern involved in simple repeating sound, colour, size, shape and positional patterns. [C, PS, V] 2. Reproduce and extend simple repeating sound, colour, size, shape and positional patterns. [CN, PS, V] 3. Create a simple repeating sound, colour, size, shape and positional pattern. [CN, PS, V]	**Specific Outcomes** 1. Describe and extend patterns using manipulatives, diagrams and spoken terms, including: • repeating patterns; • growing patterns. [C, PS, R, V] 2. Create and describe patterns using manipulatives, diagrams and spoken terms, including: • repeating patterns; • growing patterns. [C, PS, R, V] 3. Translate repeating patterns from one mode to another. [C, R, V] 4. Describe repeating patterns in personal environments. [C, CN, V]	**Specific Outcomes** 1. Describe numeric patterns including those found in a hundred chart. [C, CN, PS, R, V] 2. Describe the strategy used to determine missing elements in simple patterns, including those found in hundred charts. [C, CN, R, PS, V] 3. Create and describe repeating and growing patterns, including concrete representations of numerical and concrete and visual patterns. [C, CN, PS, V]	**Specific Outcomes** 1. Describe increasing and decreasing numeric patterns. [C] 2. Extend increasing and decreasing numeric patterns. [CN, PS, V] 3. Compare numeric patterns including those found in hundred charts. [CN, PS, R] 4. Describe the strategy used to determine missing elements in patterns. [C, R, PS] 5. Create a concrete, visual or numerical pattern when provided with the rule (limit to addition and subtraction). [PS, V]	**Specific Outcomes** 1. Describe relationships for a pattern found in tables and charts, including the multiplication chart. [C, CN, PS, V] 2. Extend increasing and decreasing numeric patterns in both directions (limited to whole numbers) and justify reasoning. [CN, PS, R, T] 3. Create increasing or decreasing numeric and concrete and visual patterns and describe the rule. [C, PS, V] 4. Create a pattern when provided with the rule and vice versa. [C, CN, PS, V]

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Patterns and Relations (Patterns)

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
Predictions	*Verify Predictions*	*Expressions*	*Predict n^{th} Term, Graph Relations*	*Substitute for Variables*
General Outcome Use patterns to describe the world and to solve problems.	**General Outcome** Use patterns to describe the world and to solve problems.	**General Outcome** Use patterns to describe the world and to solve problems.	**General Outcome** Use patterns to describe the world and to solve problems.	**General Outcome** Use patterns to describe the world and to solve problems.
Specific Outcomes 1. Describe the relationship between two columns of numbers to formulate a rule. [C, CN, PS, R] 2. Represent a pattern visually to clarify relationships and to verify predictions. [C, R, T, V] 3. Create numeric and concrete and visual patterns, record them in a table and describe the relationships. [C, PS, V]	**Specific Outcomes** 1. Describe the relationship in tables, charts and patterns using number sentences to formulate a rule. [C, CN, PS, R] 2. Analyze numeric, concrete and visual patterns to predict subsequent elements and build the pattern to verify the prediction. [CN, E, PS, R] 3. Construct graphs of given patterns to verify the prediction of subsequent elements. [CN, E, PS, R, V]	**Specific Outcomes** 1. Determine a mathematical expression to represent a given situation. [C, CN, PS, R, V] 2. Translate between an oral or written expression and an equivalent algebraic expression. [C, CN]	**Specific Outcomes** 1. Predict possible n^{th} values of a number pattern, and verify by substitution. [C, CN, E, R] 2. Construct the graph of relations, analyze the graph and draw a conclusion. [C, R, V]	**Specific Outcomes** 1. Generalize a pattern arising from a problem-solving context, using mathematical expressions and equations, and verify by substitution. [C, CN, PS, R] 2. Substitute numbers for variables in expressions, construct a graph and analyze the relation. [C, PS, R, V]

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Patterns and Relations (Patterns) (continued)

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
			Increasing & Decreasing Numeric Patterns **General Outcome** Use patterns to describe the world and to solve problems. **Specific Outcomes** 6. Determine a rule for a concrete, visual or numerical pattern. [R] 7. Extend patterns in a variety of ways and explain the rule. [C, PS, R] 8. Build and extend concrete patterns using manipulatives and record the pattern in a table. [C, PS, V]	

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Patterns and Relations (Patterns) (continued)

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9

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Patterns and Relations (Variables and Equations)

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
	Equality	*Inequality*	*Symbols*	*Role of Symbols*
	General Outcome Represent algebraic expressions in multiple ways.	**General Outcome** Represent algebraic expressions in multiple ways.	**General Outcome** Represent algebraic expressions in multiple ways.	**General Outcome** Represent algebraic expressions in multiple ways.
	Specific Outcomes 5. Describe equality as a balance and inequality as an imbalance and provide concrete examples. [C, CN, R, V] 6. Record equalities in number sentences using the equal symbol. [C, CN, PS] 7. Illustrate that different representations of the same quantity (0-18): • are equal; • represent a single quantity; • can be written as an equality. [C, CN, V]	**Specific Outcomes** 4. Illustrate that different representations of the same quantity (0-100): • are equal; • represent a single quantity; • can be written as an equality. [C, CN, V] 5. Demonstrate and explain the meaning of inequality by using objects, models and diagrams. [C, PS, R, V] 6. Record equalities and inequalities in number sentences using the equal and not equal symbols. [C, CN, PS]	**Specific Outcomes** 9. Recognize that different symbols can be used to represent an unknown in a number sentence. [R, PS] 10. Recognize that a particular symbol can represent different numbers in different number sentences. [CN, R] 11. Solve open number sentences with one unknown (symbol) using manipulatives. [CN, PS, R, V]	**Specific Outcomes** 5. Translate a given problem into an open number sentence involving one or two unknowns and find a solution. [CN, PS, R]

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Patterns and Relations (Variables and Equations)

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
Variables	*Solve Equations*	*One-Step Equations*	*Multi-Step Equations*	*Polynomial Expressions/Inequalities*
General Outcome Represent algebraic expressions in multiple ways.	**General Outcome** Represent algebraic expressions in multiple ways.	**General Outcome** Represent algebraic expressions in multiple ways.	**General Outcome** Represent algebraic expressions in multiple ways.	**General Outcome** Represent algebraic expressions in multiple ways.
Specific Outcomes 4. Translate a given problem into an open number sentence using variables (symbols including letters), and find a solution. [C, CN, PS, R] 5. Use symbols to describe the relationship for a pattern found in a table. [C, CN, PS, V]	**Specific Outcomes** 4. Explain and illustrate strategies for solving equations in one variable (with whole number coefficients and solutions). [C, CN, PS, R] 5. Demonstrate and explain the meaning of preservation of equality by balancing objects using models and diagrams. [C, CN, PS, R, V]	**Specific Outcomes** 3. Model and solve problems that can be represented by one-step linear equations of the form • $x + a = b$ • $ax = b$ • $\frac{x}{a} = b$ using a variety of strategies including concrete materials and diagrams where a and b are integers. [C, CN, PS, R]	**Specific Outcomes** 3. Identify and provide examples of constant terms, coefficients and variables. [CN, PS, V] 4. Model (concretely, pictorially and symbolically), record and explain monomial addition and subtraction. [C, CN, PS, V] 5. Model (concretely, pictorially and symbolically) and explain the distributive property when multiplying a binomial by a constant. [CN, PS, V]	**Specific Outcomes** 3. Explain and illustrate strategies to solve open number sentences involving single variable inequalities within a context. [C, CN, PS, R] 4. Translate a problem into a single variable inequality and determine a solution. [CN, PS, R] 5. Demonstrate that a variable may represent more than one number in an inequality. [C, CN, R, PS]

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Patterns and Relations (Variables and Equations) (continued)

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4

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Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
			Multi-Step Equations	*Polynomial Expressions/Inequalities*
			General Outcome Represent algebraic expressions in multiple ways.	**General Outcome** Represent algebraic expressions in multiple ways.
			Specific Outcomes 6. Model, record and explain the solution process for linear equations of the form: • $ax + b = c$ • $\frac{x}{a} + b = c$ • $ax = b + cx$ • $a(x + b) = c$ • $ax + b = cx + d$ • $a(bx + c) = d(ex + f)$ • $\frac{a}{x} = b$ where a, b, c, d, e and f are integers, using concrete materials or diagrams. [C, CN, PS, V]	**Specific Outcomes** 6. Model, record and explain the operations of addition and subtraction of polynomial expressions, concretely, pictorially and symbolically. [C, CN, PS, R, V] 7. Model, record and explain the operations of multiplication and division by monomials, concretely, pictorially and symbolically. [C, CN, R, V]

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Patterns and Relations (Variables and Equations) (continued)

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4

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Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
			Multi-Step Equations **General Outcome** Represent algebraic expressions in multiple ways. **Specific Outcomes** 7. Solve and verify equations of the form: • $ax + b = c$ • $\frac{x}{a} + b = c$ • $ax = b + cx$ • $a(x + b) = c$ • $ax + b = cx + d$ • $a(bx + c) = d(ex + f)$ • $\frac{a}{x} = b$ where a, b, c, d, e and f are integers using a variety of strategies. [PS, V]	

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Shape and Space (Measurement)

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
Single Attribute Comparison	*Duration of Events* *Concept of Measurement*	*Calendar, Concept of Unit* *Non-Standard Units*	*Relating Time to Events* *Standard Units for Length and Mass, Perimeter*	*Time, Area*
General Outcome Use direct or indirect measure to solve problems.	**General Outcome** Use direct or indirect measure to solve problems.	**General Outcome** Use direct or indirect measure to solve problems.	**General Outcome** Use direct or indirect measure to solve problems.	**General Outcome** Use direct or indirect measure to solve problems.
Specific Outcomes 1. Make direct comparisons based on a single attribute. [CN, R, V] 2. Describe attributes of objects using terms such as long, short, light and heavy. [C]	**Specific Outcomes** 1. Compare and order events according to their duration. [CN, R] 2. Demonstrate an understanding of measurement as a process of comparing by: • identifying attributes that can be compared; • ordering objects using direct measurement; • making statements of comparison; • filling, covering or matching. [C, CN, R, V]	**Specific Outcomes** 1. Measure the duration of common activities using non-standard units. [CN, R] 2. Read the date on a calendar. [C, R] 3. Relate the number of days to a week and months to a year. [CN] 4. Recognize that two objects may be different in a number of attributes, but be equivalent in another attribute. [C, R, V] 5. Demonstrate an understanding of the term "unit" by selecting and using reasonable non-standard units of measure that have the same attribute as the object being measured. [PS, R, V]	**Specific Outcomes** 1. Relate the passage of time to common activities, using standard units (minutes, hours, days, weeks, months and years). [CN, R] 2. Relate the number of minutes to hours and days to a month. [CN] 3. Write calendar dates using words and numbers. [C, PS, V] 4. Demonstrate that changing the orientation of an object does not alter the measurements of its attributes. [C, R, V] 5. Use concrete materials to demonstrate the principles of transitivity when ordering objects according to length and mass. [C,CN, R]	**Specific Outcomes** 1. Relate the passage of time to common activities using seconds. [CN] 2. Read and write time from digital and analog clocks. [C, CN, V] 3. Relate 60 seconds to a minute and 24 hours to a day. [CN] 4. Read and write calendar dates in the SI format dd/mm/yyyy. [C, V] 5. Demonstrate an understanding of the term "unit" by selecting and using reasonable non-standard and standard units (cm^2, m^2) of measure of area. [C, CN, E, R, V] 6. Relate the size of a unit of measure to the number of units used to measure area. [E, CN, V]

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Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
Volume, Capacity	*Angles, Formulas*	*Circle Geometry, Transformations*	*Pythagorean Relationship, Surface Area Formulas*	*Trigonometry*
General Outcome Use direct or indirect measure to solve problems.	**General Outcome** Use direct or indirect measure to solve problems.	**General Outcome** Use direct or indirect measure to solve problems.	**General Outcome** Use direct or indirect measure to solve problems.	**General Outcome** Use direct or indirect measure to solve problems.
Specific Outcomes 1. Read and write time from a 24-hour clock. [C, CN] 2. Relate the size of a unit of measure to the number of units used to measure volume and capacity. [E, CN, V] 3. Demonstrate an understanding of the term "unit" by selecting and using reasonable non-standard and standard units (cm^3, mL, L) of measure of volume and capacity. [E, C, R, V] 4. Select and justify referents for the units cm^3, L and mL. [C, PS, R] 5. Describe the relationship between the units mL and L. [C, CN, R]	**Specific Outcomes** 1. Demonstrate an understanding of the term "angle" by providing a variety of examples of angles including: • measure of rotation; • measure of a wedge of a circle; • measure of an inside corner of a polygon. [CN, PS, R] 2. Name and classify angles as: • acute; • right; • obtuse; • straight; • reflex; and provide examples within a context. [C, CN, V] 3. Demonstrate and explain why the sum of the interior angles of a triangle is 180° and the sum of the interior angles of a quadrilateral is 360°. [C, R]	**Specific Outcomes** 1. Establish and describe the relationships among radius, diameter and circumference of circles. [C, CN, R] 2. Solve problems involving the radii, diameters and circumferences of circles. [CN, PS, T] 3. Demonstrate that a circle can be divided into a number of congruent wedges and that the measure of each wedge can be determined by dividing 360° by the number of wedges. [CN, PR, V] 4. Perform geometric constructions including: • circles of a given radius, diameter or circumference; • perpendicular bisectors; • angle bisectors; • parallel lines; and connect them with real-world applications. [PS, V]	**Specific Outcomes** 1. Develop the Pythagorean relationship using concrete materials and diagrams. [CN, R, T] 2. Apply the Pythagorean relationship to determine the measure of the third side of a right triangle, given the measures of the other two sides in a problem-solving context. [CN, PS, R, T] 3. Apply the Pythagorean relationship to determine whether or not a triangle is a right triangle. [PS, R, T] 4. Determine the effect of changing one or more dimensions of a given 3-D object on its surface area and volume and draw conclusions. [C, E, PS, R] 5. Develop, apply and verify the formula for determining the surface area of cylinders. [PS, R]	**Specific Outcomes** 1. Determine the measure of an unknown side or an unknown angle in a right triangle using primary trigonometric ratios. [PS, R, T, V] 2. Apply sine, cosine and tangent to solve problems involving right triangles. [PS, R, T, V] 3. Develop, verify and apply the formula for determining the volume of cylinders. [C, CN, V, R] 4. Connect the formula for the area of a circle to determining the volume of a cylinder. [CN, E, PS] 5. Develop and apply strategies for determining the volume of composite 3-D objects (limit to rectangular prisms and cylinders). [PS, V]

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Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
		Calendar, Concept of Unit Non-Standard Units	*Relating Time to Events Standard Units for Length and Mass, Perimeter*	*Time, Area*
		General Outcome Use direct or indirect measure to solve problems.	**General Outcome** Use direct or indirect measure to solve problems.	**General Outcome** Use direct or indirect measure to solve problems.
		Specific Outcomes 6. Relate the size of a unit of measure to the number of units used to measure length and mass. [CN, PS, V] 7. Compare and order objects by length, height, distance around or mass using non-standard units, and make statements of comparison. [E, PS, V] 8. Estimate the length or mass of an object using non-standard units as the referent. [E, PS, V] 9. Measure length to the nearest unit by using multiple copies of a unit and by using a single copy of a unit (iteration process). [PS, V]	**Specific Outcomes** 6. Select and justify referents for the units cm, m and km. [C, CN, PS, R] 7. Describe the relationships between the units cm and m and between m and km. [C, R] 8. Select and justify referents for the units g and kg. [C, R] 9. Describe the relationship between the units g and kg. [C] 10. Describe and apply strategies to estimate the perimeter of regular and irregular shapes using referents for cm or m. [E, PS] 11. Measure the perimeter of regular and irregular shapes (cm, m). [PS, V]	**Specific Outcomes** 7. Describe and apply strategies to estimate the area of regular and irregular shapes, using referents for non-standard and standard units (cm^2, m^2). [E, PS] 8. Describe and apply strategies to estimate the surface area of right rectangular prisms, using cm^2 as a referent. [E, PS] 9. Order shapes according to their area, using non-standard units. [E, PS, V] 10. Measure, by covering, and order shapes according to their area (cm^2, m^2). [C, PS, V] 11. Determine the surface area of a right rectangular prism and describe their process. [PS, V]

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Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
Volume, Capacity	*Angles, Formulas*	*Circle Geometry, Transformations*	*Pythagorean Relationship, Surface Area Formulas*	
General Outcome Use direct or indirect measure to solve problems.	**General Outcome** Use direct or indirect measure to solve problems.	**General Outcome** Use direct or indirect measure to solve problems.	**General Outcome** Use direct or indirect measure to solve problems.	
Specific Outcomes 6. Describe and apply strategies to estimate the volume of objects or capacity of containers, using referents for non-standard and standard units (cm^3, mL, L). [CN, E, PS] 7. Order containers according to their capacity and verify by measuring, using non-standard and standard units (mL, L). [PS, V] 8. Order objects according to their volume and verify by measuring, using non-standard units and standard units (cm^3). [E, PS] 9. Construct different objects for a given volume, using non-standard units and standard units (cm^3), and draw conclusions. [PS, R, V]	**Specific Outcomes** 4. Estimate the measure of an angle using 45°, 90° or 180° as reference angles. [E] 5. Draw an angle when the measure of the angle in degrees is specified. [E, PS, V] 6. Measure angles using a circular protractor. [PS, V] 7. Develop, apply and verify rules and formulas for determining the perimeter of polygons. [CN, PS, R] 8. Develop, apply and verify rules and formulas for determining the area of rectangles. [CN, PS, R]	**Specific Outcomes** 5. Develop, verify and apply the formula for determining the area of a triangle. [CN, PS, R] 6. Develop, verify and apply the formula for determining the area of a parallelogram. [CN, PS, R] 7. Explain how the formula for determining the area of a circle is derived and apply the formula to solve problems. [C, CN, PS]	**Specific Outcomes** 6. Connect the formula for determining the area of rectangles to determine the surface area of composite 2-D shapes. [CN, E, PS] 7. Connect the formula for determining the area of rectangles to determine the surface area of composite 3-D objects. [CN, PS]	

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Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
			Relating Time to Events Standard Units for Length and Mass, Perimeter	*Time, Area*
			General Outcome Use direct or indirect measure to solve problems.	**General Outcome** Use direct or indirect measure to solve problems.
			Specific Outcomes 12. Measure and order objects according to a linear attribute (cm, m). [E, PS, V] 13. Measure and order objects according to their mass (g, kg). [E, PS, V] 14. Draw and construct shapes of specific linear measurements (cm, m). [PS, V] 15. Construct different shapes, for a given perimeter (cm, m), to demonstrate that many shapes are possible. [CN, PS]	**Specific Outcomes** 12. Construct different shapes, given a specific area in non-standard units and draw conclusions. [C, E, PS] 13. Construct different shapes, for a given area (cm^2), to demonstrate that many shapes are possible. [PS]

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Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
Volume, Capacity	*Angles, Formulas*			
General Outcome Use direct or indirect measure to solve problems.	**General Outcome** Use direct or indirect measure to solve problems.			
Specific Outcomes 10. Design and construct different rectangles, given one or both of perimeter and area, using whole numbers, and draw conclusions. [PS, R] 11. Predict and verify the effect of changing one or more dimensions of a rectangle on its perimeter and area. [E, PS, R]	**Specific Outcomes** 9. Connect the formula for determining the area of rectangles to determining the surface area of a right rectangular prism. [CN, E, PS] 10. Develop, apply and verify rules and formulas for determining the volume of right rectangular prisms. [PS, R]			

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Shape and Space (3-D Objects and 2-D Shapes)

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
Objects and Shapes	*One Attribute*	*Two Attributes*	*Two or More Attributes*	*Nets, Pyramids and Prisms*
General Outcome Describe the characteristics of 3-D objects and 2-D shapes and analyze the relationships among them.	**General Outcome** Describe the characteristics of 3-D objects and 2-D shapes and analyze the relationships among them.	**General Outcome** Describe the characteristics of 3-D objects and 2-D shapes and analyze the relationships among them.	**General Outcome** Describe the characteristics of 3-D objects and 2-D shapes and analyze the relationships among them.	**General Outcome** Describe the characteristics of 3-D objects and 2-D shapes and analyze the relationships among them.
Specific Outcomes 3. Identify the single attribute used to sort pre-sorted sets. [R, V] 4. Copy and create designs using manipulatives. [CN, PS, V] 5. Replicate a given 3-D structure. [CN, PS, V]	**Specific Outcomes** 3. Classify and describe 3-D objects according to two attributes. [C, PS, R, V] 4. Identify and sort objects and shapes, using one attribute determined by the student, and explain the sorting rule. [C, CN, R, V] 5. Compare and match 3-D objects with objects in the environment. [CN, R] 6. Replicate structures in the environment using 3-D objects. [CN, R, V] 7. Compare and match 2-D shapes to parts of 3-D objects in the environment. [CN, C, R] 8. Investigate and predict the results of putting together and taking apart 2-D shapes and 3-D objects. [PS, V]	**Specific Outcomes** 10. Sort regular and irregular shapes and objects using two attributes, and explain the sorting rule. [PS, R, V] 11. Record the results of sorting in a variety of ways, including Venn and Caroll diagrams. [C, PS, R, V] 12. Describe, compare, name and construct 3-D objects including: • cubes; • spheres; • cones; • cylinders; • pyramids. [C, R, V]	**Specific Outcomes** 16. Sort regular and irregular shapes and objects using two or more attributes, and explain and record the sorting rule. [C, CN, R, V] 17. Identify and name the faces of 3-D objects with appropriate 2-D names. [C, R, V] 18. Describe the characteristics of 3-D objects, including faces, edges, and vertices. [C, R, V] 19. Identify possible 3-D objects based upon the known shape of a face. [C, PS, V]	**Specific Outcomes** 14. Design and construct nets for 3-D objects. [C, CN, PS, V] 15. Predict and verify 3-D objects from a given net. [C, PS, V] 16. Describe and give examples from everyday experience of: • parallel; • intersecting; • perpendicular; • vertical; • horizontal. [C, CN, V] 17. Describe and name pyramids and prisms by the shape of the base. [C, CN, V] 18. Compare and contrast: • two or more pyramids; • two or more prisms; • pyramids and prisms. [C, CN, V]

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Shape and Space (3-D Objects and 2-D Shapes) (continued)

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
Polygons	*Angles of Triangles, Quadrilaterals*	*Similarity and Congruence of Triangles*	*Similarity and Congruence of Polygons*	*Plans and Elevations of 3-D Objects*
General Outcome Describe the characteristics of 3-D objects and 2-D shapes and analyze the relationships among them.	**General Outcome** Describe the characteristics of 3-D objects and 2-D shapes and analyze the relationships among them.	**General Outcome** Describe the characteristics of 3-D objects and 2-D shapes and analyze the relationships among them.	**General Outcome** Describe the characteristics of 3-D objects and 2-D shapes and analyze the relationships among them.	**General Outcome** Describe the characteristics of 3-D objects and 2-D shapes and analyze the relationships among them.
Specific Outcomes 12. Build, represent and compare and classify regular and irregular polygons, including convex and non-convex polygons. [C, CN, R, V] 13. Identify and draw polygons with different orientations. [C, R, V]	**Specific Outcomes** 11. Construct, analyze and classify triangles in different orientations according to the length of their sides. [PS, R, V] 12. Classify triangles according to the measure of their interior angles. [PS, R, V] 13. Identify and sort quadrilaterals according to their attributes including: • rectangles; • squares; • trapezoids; • parallelograms; • rhombuses. [C, R, V]	**Specific Outcomes** 8. Identify and describe the properties that define similar triangles. [C, CN, R, V] 9. Solve problems using the properties of similar triangles. [CN, PS] 10. Identify and describe the properties that define congruent triangles. [C, R, V] 11. Solve problems using the properties of congruent triangles. [CN, PS] 12. Demonstrate that similar triangles may be congruent and that congruent triangles are similar. [C, PS, R, T, V]	**Specific Outcomes** 8. Identify and describe the properties that define similar 2-D shapes. [C, CN, R, V] 9. Solve problems using the properties of similar 2-D shapes. [CN, PS] 10. Identify and describe the properties that define congruent 2-D shapes. [C, R, V] 11. Solve problems using the properties of congruent 2-D shapes. [CN, PS] 12. Demonstrate that similar 2-D shapes may be congruent and that congruent 2-D shapes are similar. [C, PS, R, V]	**Specific Outcomes** 6. Sketch and draw a 3-D object, given its plan and elevation views. [C, CN, PS, T, V] 7. Draw the plan and elevations of a 3-D object from sketches and models. [C, CN, R, T, V] 8. Build a 3-D object, given its plan and elevation views. [CN, PS, T, V] 9. Sketch, draw a scale diagram, and build a 3-D object. [CN, V] 10. Draw and interpret scale diagrams. [CN, PS, T] 11. Construct, analyze and describe enlargements and reductions. [C, CN, R, V]

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Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
		Two Attributes	*Two or More Attributes*	
		General Outcome Describe the characteristics of 3-D objects and 2-D shapes and analyze the relationships among them.	**General Outcome** Describe the characteristics of 3-D objects and 2-D shapes and analyze the relationships among them.	
		Specific Outcomes 13. Describe, compare, name and draw 2-D shapes in different orientations including: • squares • rectangles • circles • triangles. [C, R, V] 14. Demonstrate an understanding of the relationships between 2-D shapes and 3-D objects by relating 3-D objects to their 2-D representations. [CN, C, R, V]	**Specific Outcomes** 20. Describe, compare, name and model regular and irregular polygons according to the number of sides, including: • quadrilaterals • pentagons • hexagons • octagons. [CN, C, R, V]	

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Shape and Space (3-D Objects and 2-D Shapes) (continued)

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9

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Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
				Symmetry
				General Outcome Describe and analyze position and motion.
				Specific Outcomes 19. Create and describe symmetrical 2-D shapes. [C, PS, V] 20. Verify that a 2-D shape is symmetrical by drawing one or more lines of symmetry. [PS, V]

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Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
Single Transformations	*Combination of Transformations*	*Coordinate Grid*	*Tesselations*	*Dilatations*
General Outcome Deseribe and analyze position and motion.	**General Outcome** Deseribe and analyze position and motion.	**General Outcome** Deseribe and analyze position and motion.	**General Outcome** Deseribe and analyze position and motion.	**General Outcome** Deseribe and analyze position and motion.
Specific Outcomes 14. Perform and deseribe a single transformation as a translation, rotation or a refleetion. [C, T, V] 15. Reeognize and deseribe a single transformation as a translation, rotation or a refleetion. [C, T, V] 16. Recognize and demonstrate that a rotation can oeeur around a variety of points. [CN, PS, T] 17. Reeognize and demonstrate that the refleetion image depends upon the position of the line of refleetion. [CN, PS, T, V] 18. Prediet and verify the results of a translation, rotation or refleetion. [C, E, V] 19. Draw and deseribe the image of a 2-D shape after a single transformation. [C, V]	**Specific Outcomes** 14. Draw and deseribe the image of a 2-D shape as a result of a combination of translation(s) rotation(s) and/or refleetion(s). [C, T, V] 15. Create, deseribe and analyze designs using translations, rotation and refleetions. [C, CN, T, V] 16. Specify loeations and deseribe paths using ordered pairs in the first quadrant. [C, CN] 17. Deseribe positional ehange, using horizontal (left-right) and vertieal (up-down) deseriptors in relation to a referenee point. [C, PS, V]	**Specific Outcomes** 13. Plot and read ordered pairs on a Cartesian plane to: • illustrate translation, rotation and refleetion images; • deseribe the eoordinates and movement of images during translation, rotation and refleetion. [C, PS, V] 14. Create, analyze and deseribe designs using translations, rotations and refleetions on a Cartesian plane. [C, T, V] 15. Reeognize and demonstrate the congruenee of a triangle with its: • translation image; • rotation image; • refleetion image. [R]	**Specific Outcomes** 13. Explain the properties of shapes that make tessellation possible. [C, V] 14. Recognize tessellations ereated with regular and irregular shapes in a variety of contexts. [CN, V] 15. Create tessellations using transformations (translation, refleetion, and rotation). [C, PS, T, V] 16. Deseribe a series of transformations that ean result in a given tessellation. [C, CN, V]	**Specific Outcomes** 12. Draw the image of a 2-D shape as a result of a dilatation. [PS, T, V] 13. Demonstrate that a triangle and its dilatation image are similar. [R] 14. Represent, analyze and deseribe dilatations in an everyday eontext. [C, CN, T, V]

Statistics and Probability (Data Analysis)

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
		Gather, Record Data about Self, Concrete/Object Graphs	*Organize Data*	*First-Hand Data*
		General Outcome Collect, display and analyze data to solve problems.	**General Outcome** Collect, display and analyze data to solve problems.	**General Outcome** Collect, display and analyze data to solve problems.
		Specific Outcomes 1. Gather and record data about self to answer questions relevant to their world. [C, CN, PS] 2. Construct, discuss, and interpret concrete/object graphs and pictographs to answer questions. [C, E, PS, R, V]	**Specific Outcomes** 1. Organize data using tally marks, line plots, diagrams, charts and lists to solve problems. [CN, E, PS, V] 2. Construct and label bar graphs using one-to-one correspondence to answer questions. [PS, V] 3. Interpret concrete/object graphs, pictographs and bar graphs by drawing conclusions and making predictions. [C, E, PS, R, V]	**Specific Outcomes** 1. Answer questions by collecting first-hand data and displaying it in a variety of ways, using many to one correspondence. [C, PS, T, V] 2. Justify the choice of intervals and correspondence used. [C, R, T, V] 3. Interpret pictographs and bar graphs involving many to one correspondence to draw conclusions and make predictions. [C, E, PS, R]

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Statistics and Probability (Data Analysis)

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
Second-Hand Data	*Collected Data*	*Central Tendency*	*Bias/Data Issues*	*Investigation*
General Outcome Collect, display and analyze data to solve problems.	**General Outcome** Collect, display and analyze data to solve problems.	**General Outcome** Collect, display and analyze data to solve problems.	**General Outcome** Collect, display and analyze data to solve problems.	**General Outcome** Collect, display and analyze data to solve problems.
Specific Outcomes 1. Answer questions by collecting second-hand data and displaying it in a variety of ways including: • double bar graphs; • frequency diagrams. [C, PS, T, V] 2. Interpret frequency diagrams and double bar graphs to draw conclusions and make predictions. [C, E, PS, R, V] 3. Justify the appropriateness of using first-hand and/or second-hand data to answer a question. [C, PS] 4. Evaluate the graphic presentation of the data to ensure clear representation of the results. [C, R, V] 5. Discuss the reasonableness of data and results. [C, R]	**Specific Outcomes** 1. Organize collected data and display it in an appropriate manner and analyze it in order to answer a question. [C, CN, PS] 2. Construct and label broken-line and straight-line graphs to answer questions. [C, CN, PS, V] 3. Select, justify and use appropriate methods of collecting data including: • designing and using questionnaires; • designing and performing experiments; • making observations; • using electronic media. [C, PS, T] 4. Interpret a variety of graphs including: • broken-line graphs; • straight-line graphs; to draw conclusions and make predictions. [C, E, PS, R]	**Specific Outcomes** 1. Demonstrate an understanding of central tendency and range by: • calculating and analyzing the measures of central tendency (mean, median, mode) and range; • determining the most appropriate measures of central tendency to report findings and to defend choices; • formulating questions for further investigation. [C, PS, T] 2. Identify outliers and justify whether or not they are to be included in the analysis of set of data. [C, R, V] 3. Determine the effect on the mean, median and/or mode when an outlier is included in the data set. [C, CN, R]	**Specific Outcomes** 1. Analyze and critique ways in which displayed data and/or conclusions are presented by the media and other sources. [C, R] 2. Analyze data sets to make comparisons. [E, PS, R] 3. Identify and describe issues to be considered when collecting data including: • appropriate language; • ethics; • cost; • privacy; • cultural sensitivity. [C, CN, R] 4. Distinguish between a population and a sample of that population to determine whether or not the sample is representative of the population, and identify factors that might affect representativeness. [CN, R]	**Specific Outcomes** 1. Develop and implement a plan for the collection, display and analysis of data by: • formulating a question for investigation; • choosing an appropriate data collection method that includes social considerations; • selecting a population or an appropriate sample and justify it; • collecting the data; • displaying the collected data in an appropriate manner; • draw conclusions to answer the question; • extrapolating. [C, E, PS, R, T]

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Statistics and Probability (Data Analysis)

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4

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Statistics and Probability (Data Analysis) (continued)

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
	Collected Data	*Central Tendency*	*Bias/Data Issues*	
	General Outcome Collect, display and analyze data to solve problems.	**General Outcome** Colleet, display and analyze data to solve problems.	**General Outcome** Collect, display and analyze data to solve problems.	
	Specific Outcomes 5. Formulate questions for investigation, given a context. [C, CN, PS, R]	**Specific Outcomes** 4. Construct, label and interpret eirele graphs to answer questions. [C, E, PS, R]	**Specific Outcomes** 5. Select and defend the choiee of an appropriate sample or population to be used to answer a question. [C, CN, PS, R] 6. Assess and report the strengths, weaknesses and biases of samples and data eollection methods. [C, R, T]	

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Statistics and Probability (Chance and Uncertainty) (continued)

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4

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Statistics and Probability (Chance and Uncertainty) (continued)

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
Single Event	*Single Event*	*Two Independent Events*	*Two Independent Events*	*Two Independent Events*
General Outcome Use experimental or theoretical probabilities to represent and solve problems involving uncertainty.	**General Outcome** Use experimental or theoretical probabilities to represent and solve problems involving uncertainty.	**General Outcome** Use experimental or theoretical probabilities to represent and solve problems involving uncertainty.	**General Outcome** Use experimental or theoretical probabilities to represent and solve problems involving uncertainty.	**General Outcome** Use experimental or theoretical probabilities to represent and solve problems involving uncertainty.
Specific Outcomes 6. Explain the meaning of event and outcomes in the context of probability. [C, R] 7. Describe outcomes as likely or unlikely and describe the degree of likelihood using words such as: • certain; • impossible; • equally likely/probable; • more likely/probable; • less likely/probable. [C, CN, PS, R] 8. Recognize that different outcomes may occur when repeating the same probability experiment. [PS, T] 9. Make predictions for a single event probability experiment using the language of probability, conduct the experiment and compare the predictions to the results. [C, E, PS]	**Specific Outcomes** 6. Describe experimental probability as the number of favourable outcomes over the number of possible outcomes. [C, E, PS] 7. Describe theoretical probability as the number of favourable outcomes over the number of possible outcomes. [C, E, PS] 8. Compare experimental results with theoretical data for single event probability experiments. [C, CN, PS, R] 9. Consider a single event experiment and identify and describe outcomes that are equally likely/probable, more likely/probable and less likely/probable. [C, E, PS]	**Specific Outcomes** 5. Distinguish between independent and dependent events. [C, R] 6. List all possible outcomes for a probability experiment involving two independent events. [C, E, PS] 7. Make predictions for a probability experiment involving two independent events, conduct the experiment and compare the predictions to the results. [C, E, PS]	**Specific Outcomes** 7. Determine and compare the theoretical and experimental probability of two independent events. [C, E, PS, R]	**Specific Outcomes** 2. Provide and explain examples that show the role of probability and statistics in society. [C, CN, R] 3. Design and conduct simulations, and use the results to draw conclusions. [C, CN, PS, T] 4. Make predictions about populations based on experimental probabilities. [C, CN, E, PS, R] 5. Explain how decisions based on probability may involve the consideration of theoretical calculations, experimental results and subjective judgements. [C, R]

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